UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

CPC Operational Outlooks: Launch Schedule, Forecast Process and Recent Verification

Jon Gottschalck

Operational Prediction Branch
NWS / NCEP / Climate Prediction Center

Climate Diagnostics and Prediction Workshop
College Park, MD
October 21-24, 2013

Outline

(1) Review CPC Operational Outlooks: Launch schedule, forecast process and select tools

(2) Recent verification over the 1-1.5 years

Forecasts Reviewed:

- **Extended Range Outlooks (Days 6-10 and Days 8-14)**
- **Monthly and Seasonal Outlooks**
- Drought Outlooks
- Hazards Outlooks (U.S., Global Tropics, Africa, Central America, etc.)

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CPC Intraseasonal-to-Interannual Outlooks

Outlook	Variables	Type	Frequency	Release Date	Release Time
Days 8-14	Temp/Precip	Probabilistic	Daily	Daily	3 PM
Monthly	Temp/Precip	Probabilistic	2x per month	3rd Thurs of month / Last day of month	8:30 AM, 3 PM
Seasonal	Temp/Precip	Probabilistic	1x per month	3rd Thursday of month	8:30 AM
Monthly drought	Drought tendency	Categorical	1x per month	Last day of month	3 PM
Seasonal drought	Drought tendency	Categorical	1x per month	3rd Thursday of month	8:30 AM
U.S. Hazards	Temps, precip, winds, etc.	Categorical	Daily	Monday - Friday	3 PM
Global Tropics, Africa, etc.	Precip, TCs, etc.	Categorical	Weekly	Tuesday or Wednesday	12 PM

CPC Operational Outlooks

- **Extended Range Outlooks**
- Monthly and Seasonal Outlooks

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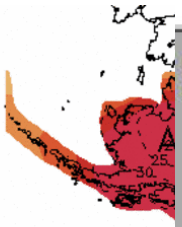
Extended Range Forecast (ERF)

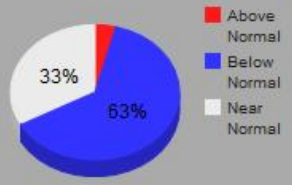
INTERACTIVE DISPLAY - UPDATED: 16 OCT 2013



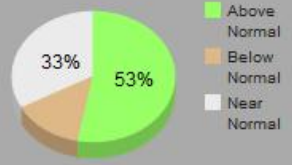
1314-1362 East Hastings Lake Road, Jonesville, MI 49250, USA

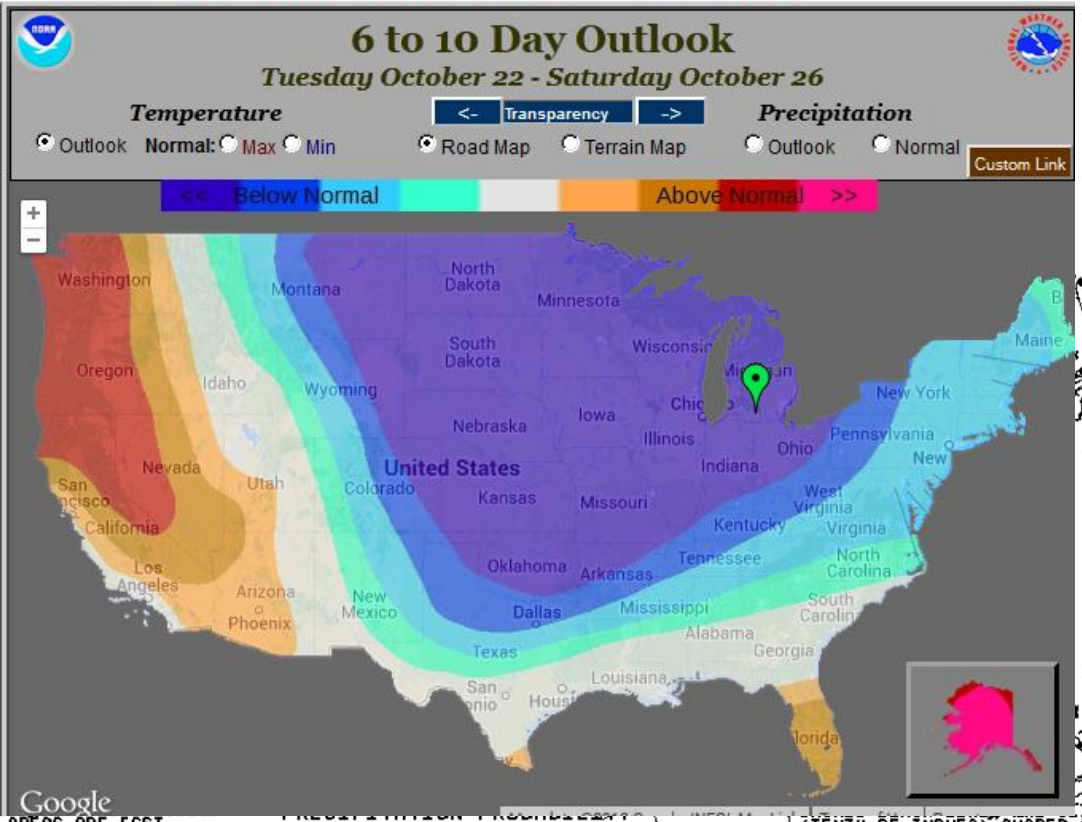
Enter Location | Enter

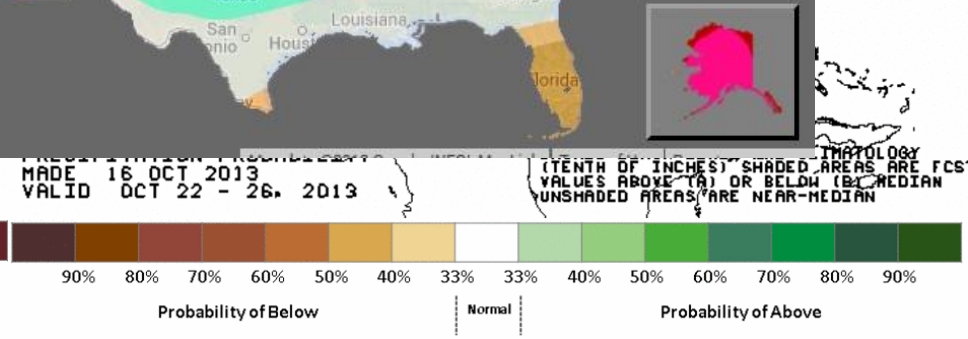
Three Category Temperature Outlook
Normal Maximum Temperature: 57
Normal Minimum Temperature: 37



Three Category Precipitation Outlook
Normal Precipitation: 0.51



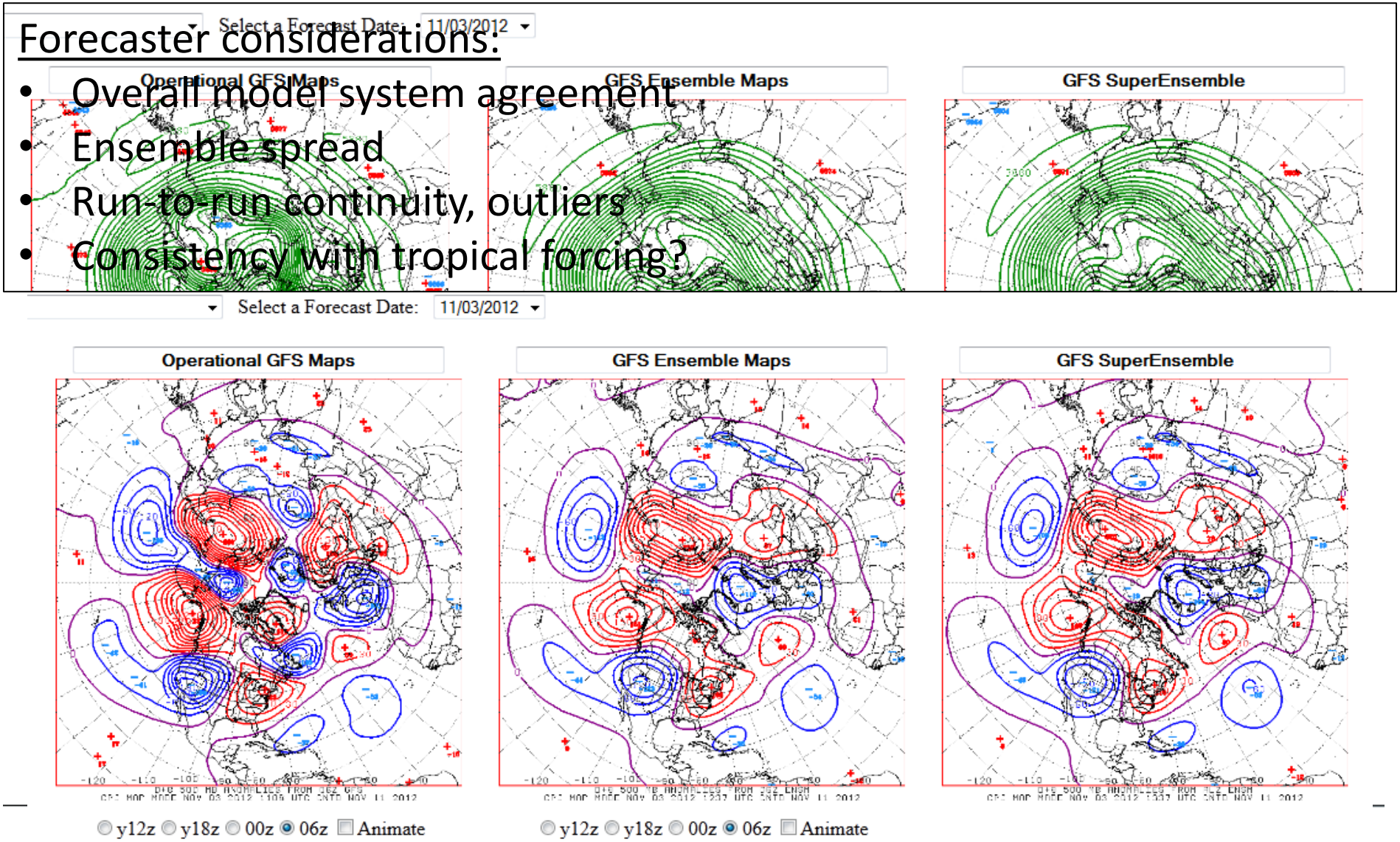




Assessment of Models

Forecaster considerations:

- Overall model system agreement
- Ensemble spread
- Run-to-run continuity, outliers
- Consistency with tropical forcing?



ERF Process

Dynamical model forecasts

Historical observations

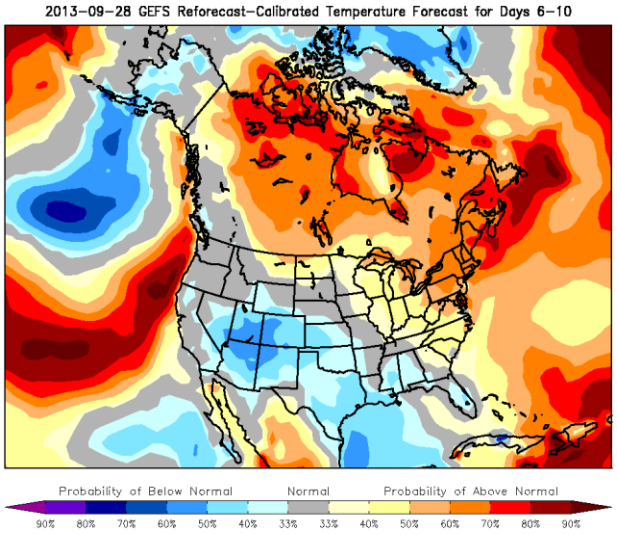
Downscaling methodologies, (regression, analogs, teleconnections, etc.

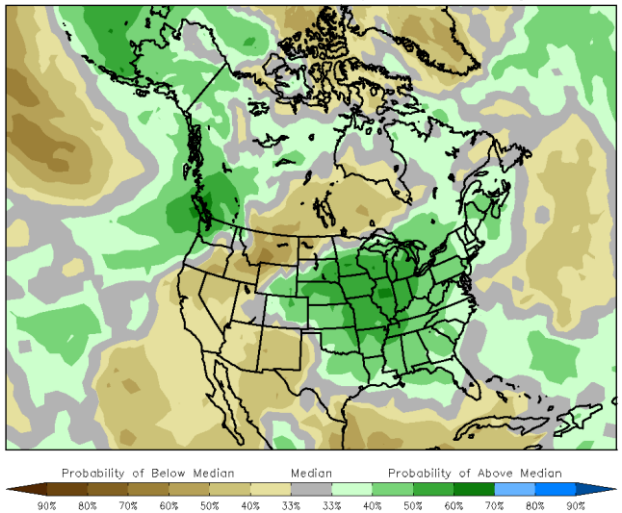
(1) Subjectively weighted average official 500-hPa height and anomaly outlook
(2) Downscale to create a set of surface temp and precipitation tools
(3) Direct Model Post Processed Output
(4) Assess other factors (MJO, AO, snow cover, SST, soil moisture, etc.)
(5) Probabilistic temp/precip maps created subjectively based on objective tools
(6) Write prognostic forecast discussion outlining rationale, challenges and uncertainty of the forecast

Dissemination to public

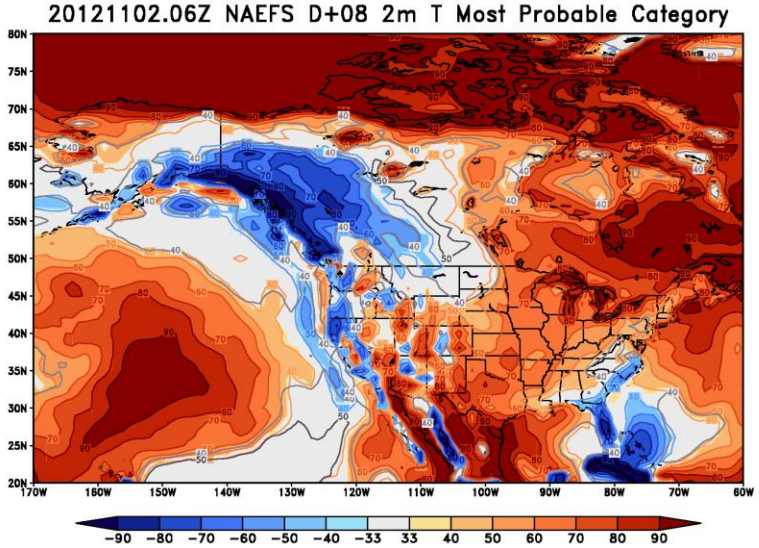
Direct Model Post Processed Output

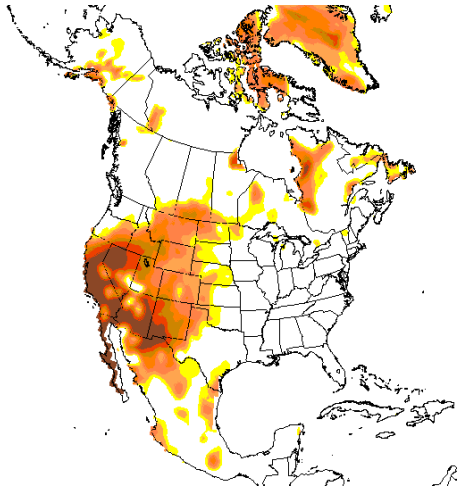
ESRL Reforecast – Hindcast Calibration

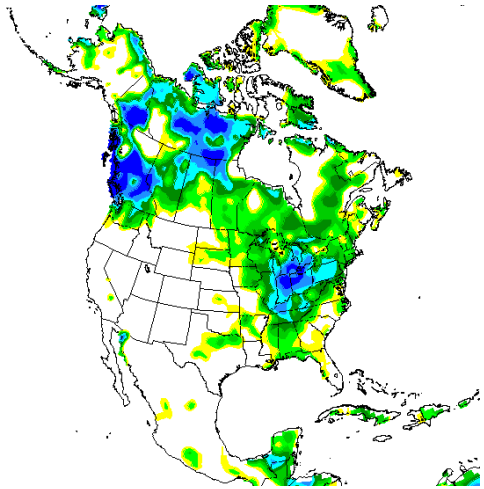




NAEFS –Recent Conditions Calibration

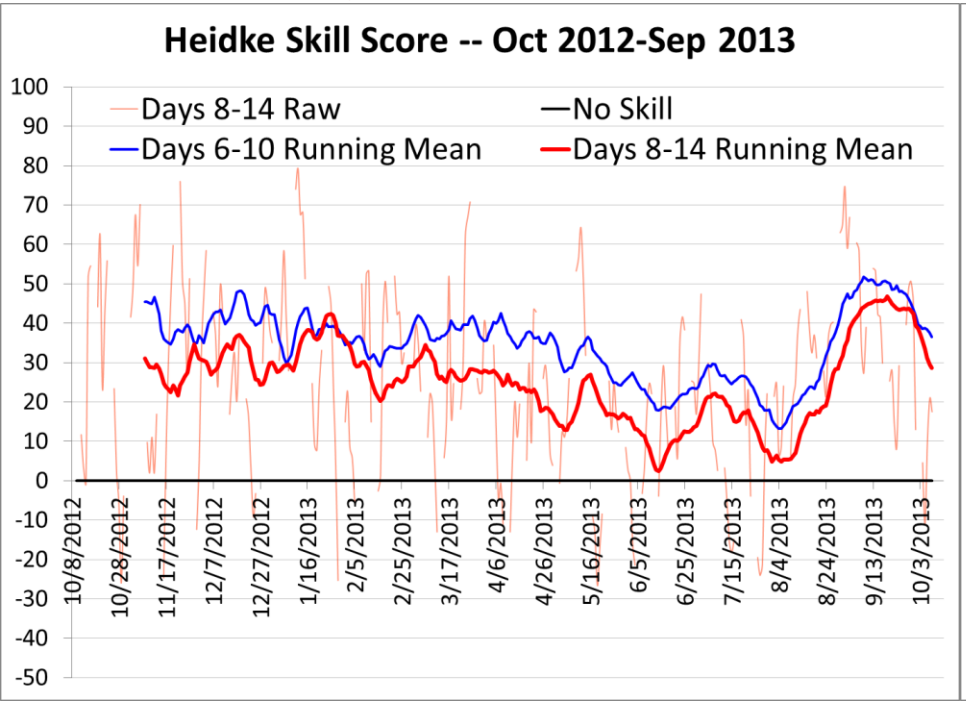






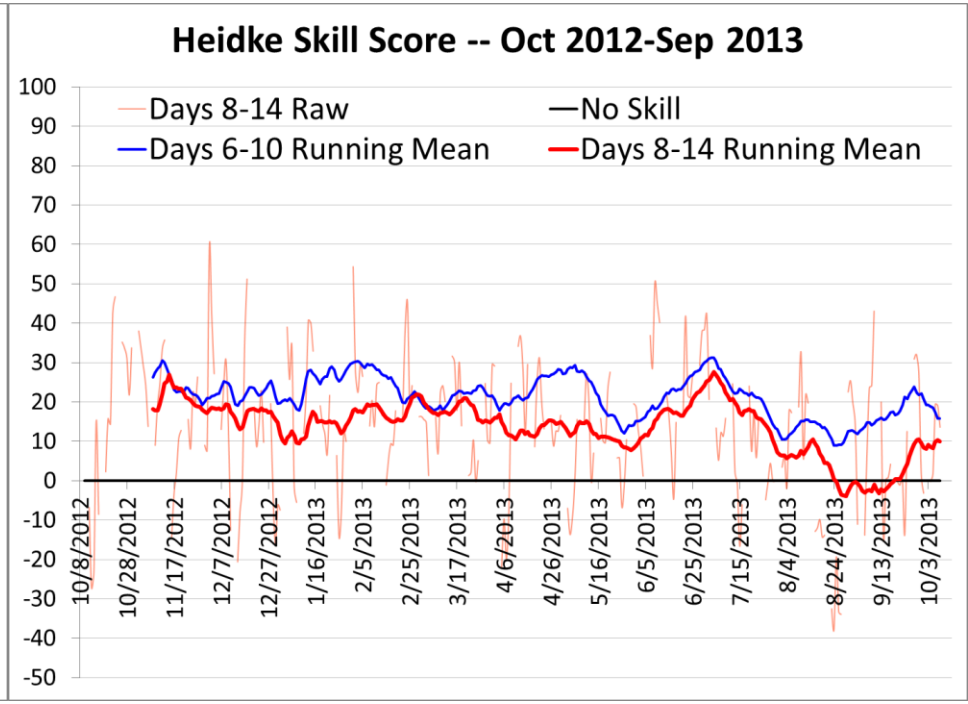
ERF Verification – Time Series

Days 8-14 Temperature



Outlook Type	Averaging Period	HSS
Days 8-14	Past year	25.2
Days 6-10	Past year	34.7
Days 8-14	2008-2013	23.4

Days 8-14 Precipitation

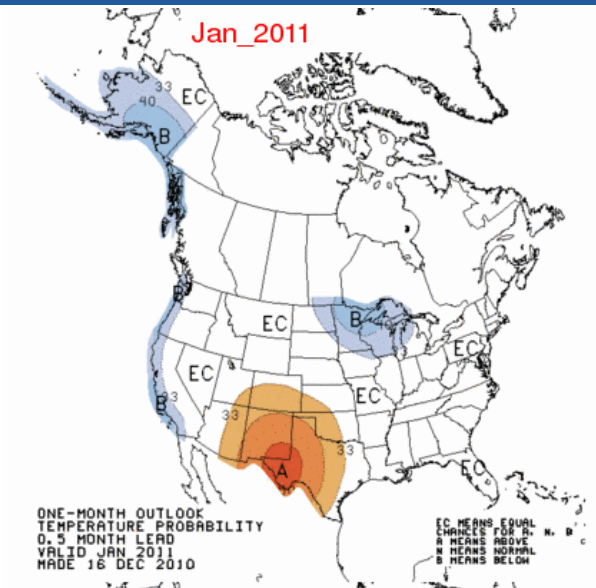


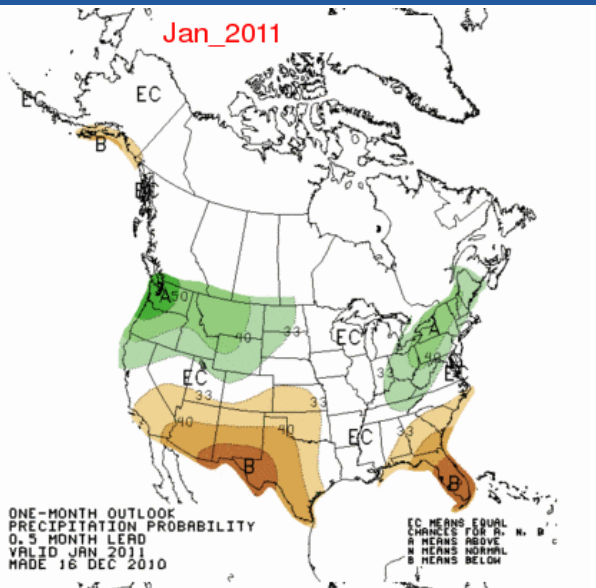
Outlook Type	Averaging Period	HSS
Days 8-14	Past year	13.4
Days 6-10	Past year	21.2
Days 8-14	2008-2013	10.2

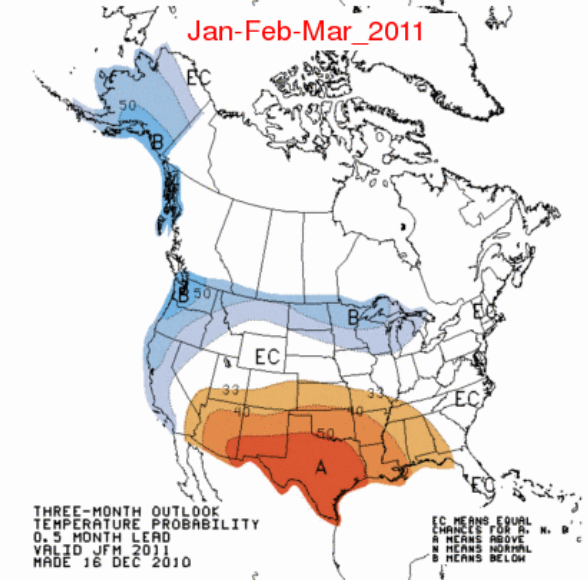
CPC Operational Outlooks

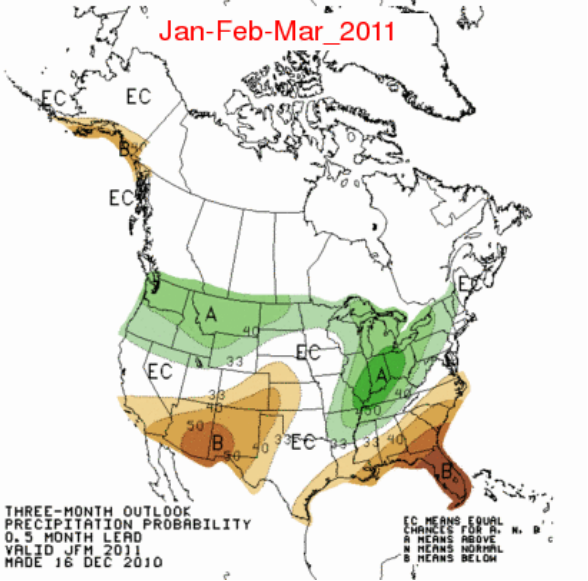
- Extended Range Outlooks
- **Monthly and Seasonal Outlooks**

Monthly / Seasonal Outlooks (LRF)





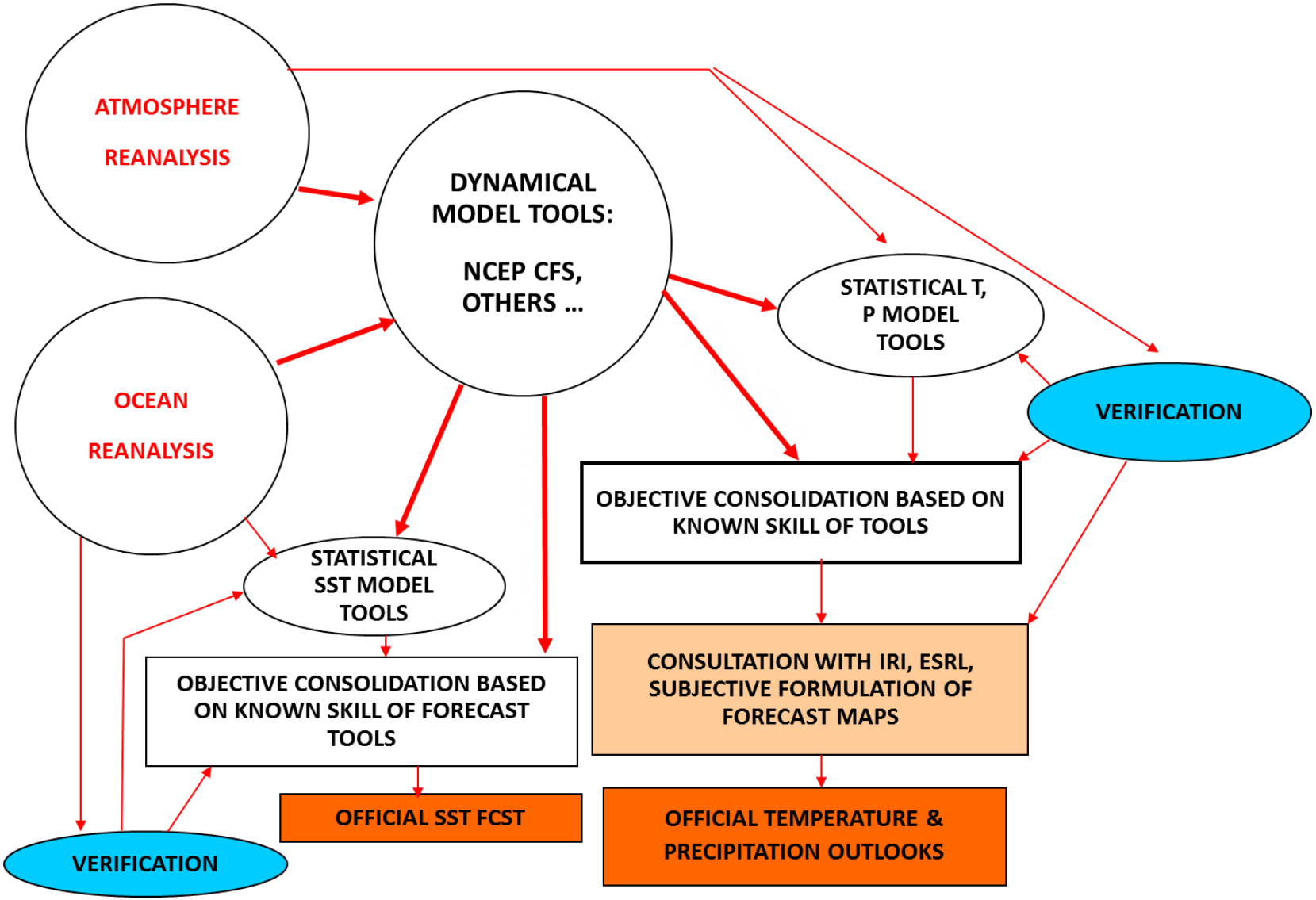




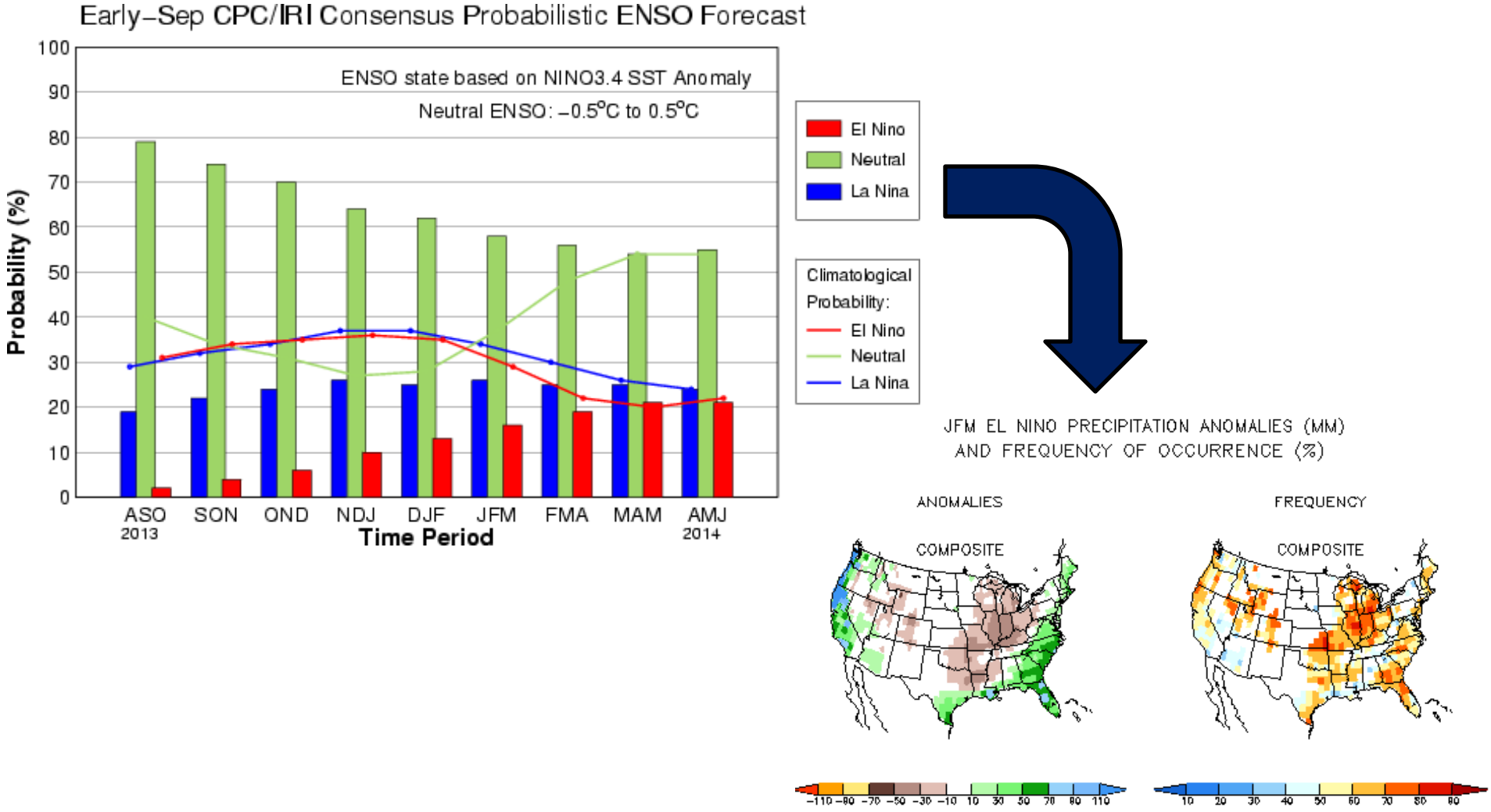
Monthly

Seasonal

LRF Process

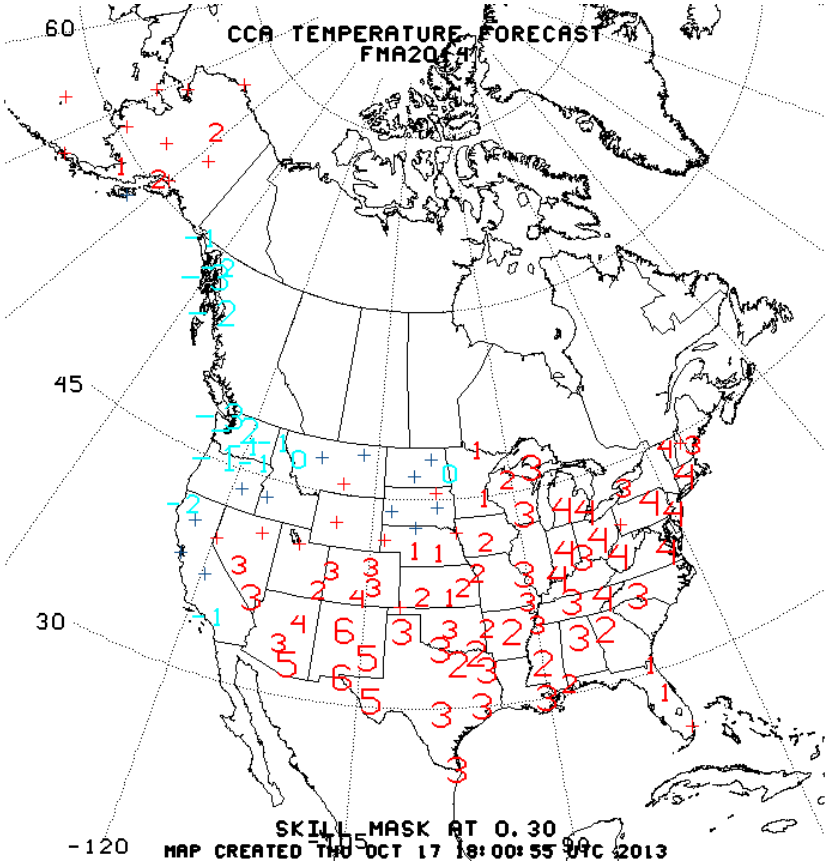

ATMOSPHERE REANALYSIS
OCEAN REANALYSIS
DYNAMICAL MODEL TOOLS: NCEP CFS, OTHERS …
STATISTICAL T, P MODEL TOOLS
VERIFICATION
OBJECTIVE CONSOLIDATION BASED ON KNOWN SKILL OF TOOLS
STATISTICAL SST MODEL TOOLS
OBJECTIVE CONSOLIDATION BASED ON KNOWN SKILL OF FORECAST TOOLS
CONSULTATION WITH IRI, ESRL, SUBJECTIVE FORMULATION OF FORECAST MAPS
OFFICIAL SST FCST
OFFICIAL TEMPERATURE & PRECIPITATION OUTLOOKS
VERIFICATION

ENSO Outlook

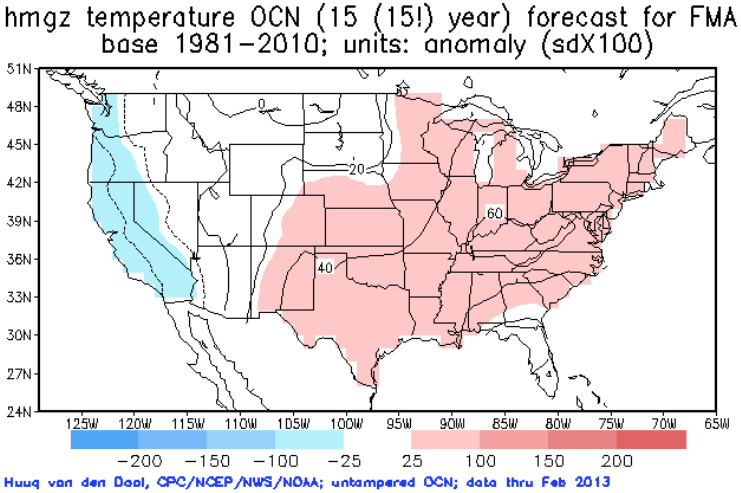


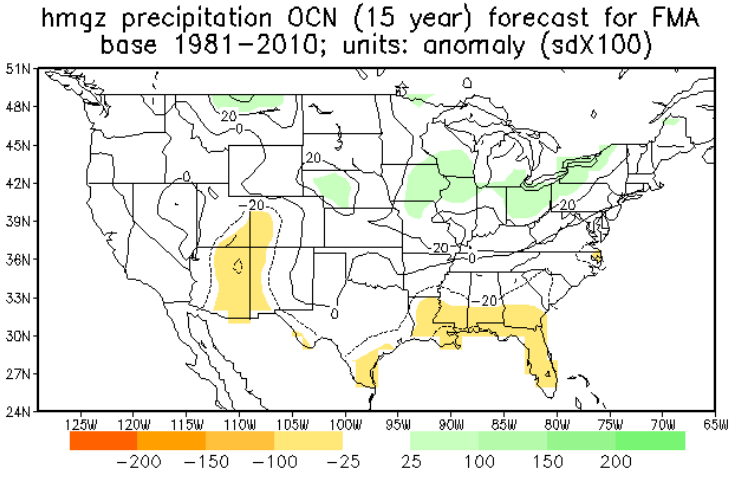
Forecast Guidance

Canonical Correlation Analysis



Long term trends





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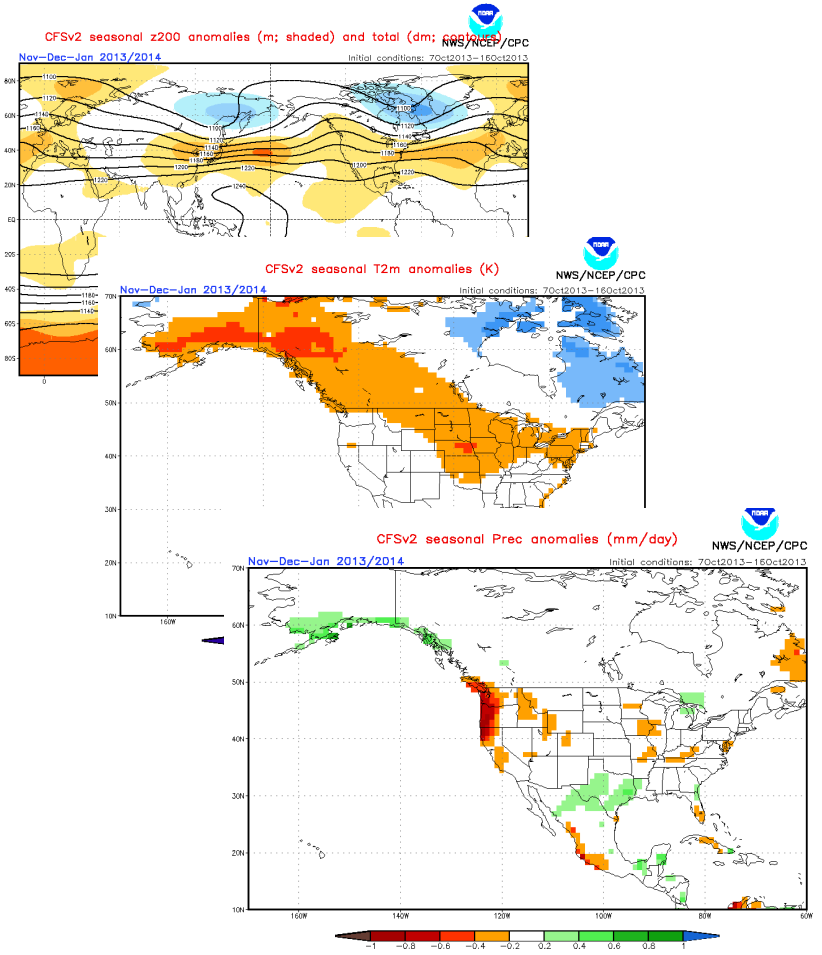
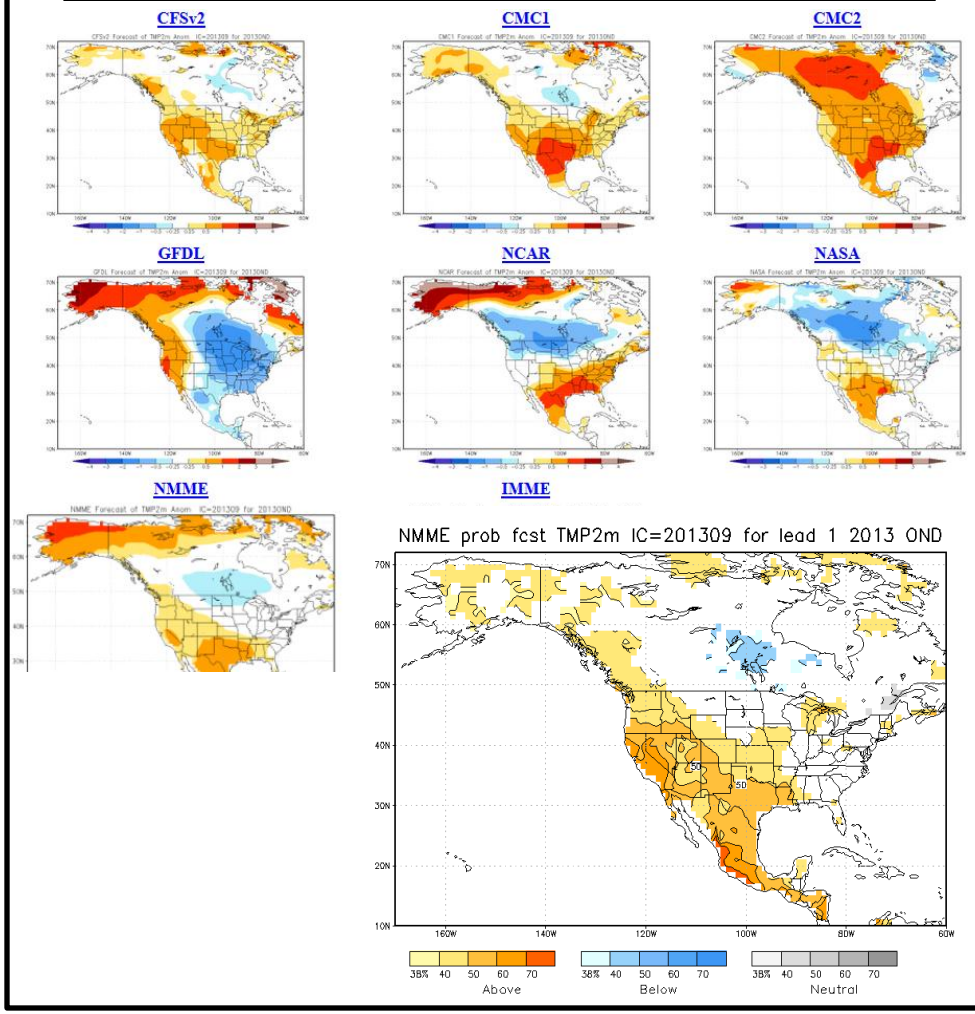
Forecast Guidance

Climate Forecast System

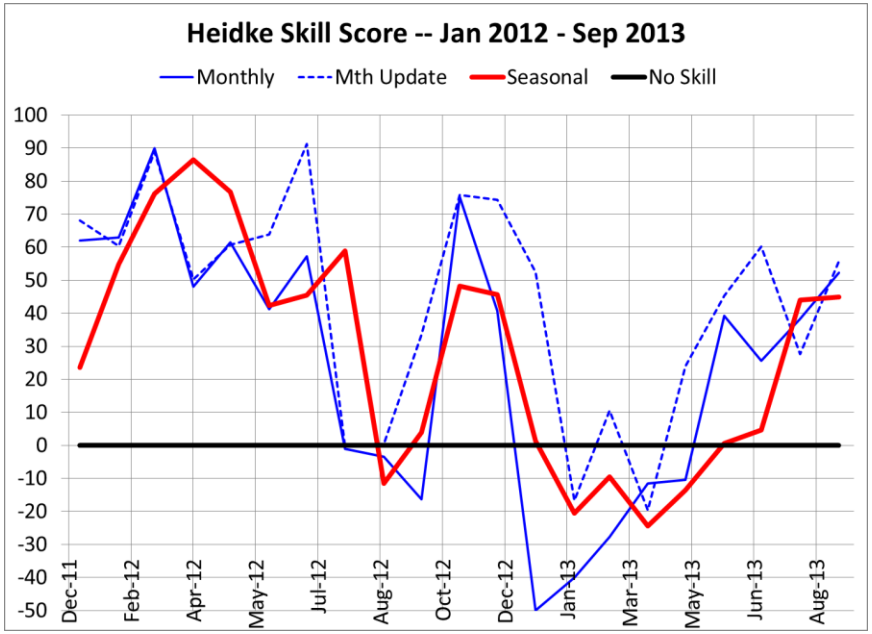


National Multi Model Ensemble



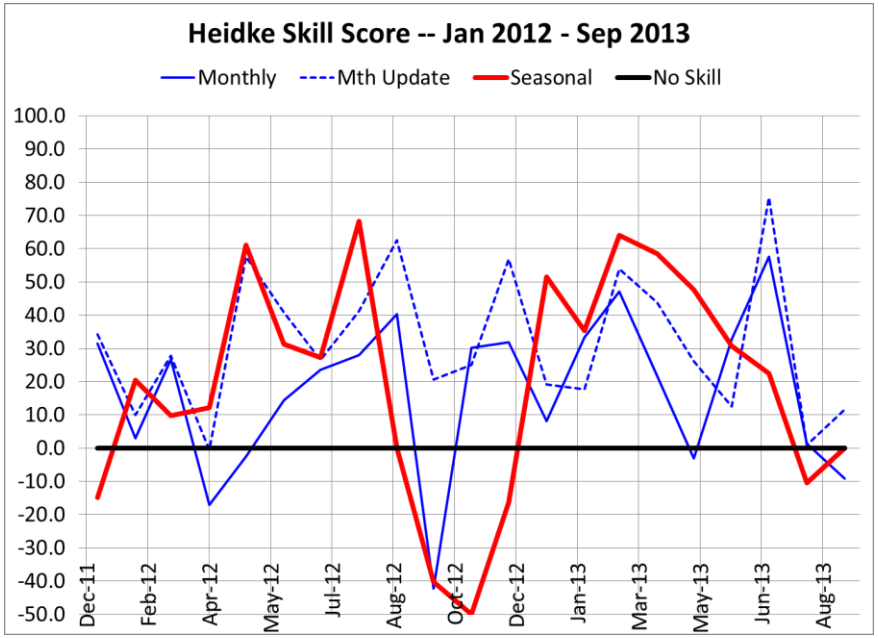
LRF Verification – Time Series

Temperature



Outlook Type	Averaging Period	HSS
Seasonal	Past year	27.5
Monthly	Past year	25.4
Revised Monthly	Past year	43.2
Seasonal	1995-2013	23.6

Precipitation



Outlook Type	Averaging Period	HSS
Seasonal	Past year	19.5
Monthly	Past year	17.0
Revised Monthly	Past year	31.6
Seasonal	1995-2013	13.3

FY14 Ongoing Work

- CPC is developing an objective, skill weighted consolidation for the ERF using ensemble regression similar to what has been done with the LRF
- Emphasis on transition of CPC Hazards Outlooks to probabilistic formats targeting Week-2
- Inclusion of NMME forecast into current LRF consolidation process
- Revisit trends and how best to use in CPC seasonal outlooks

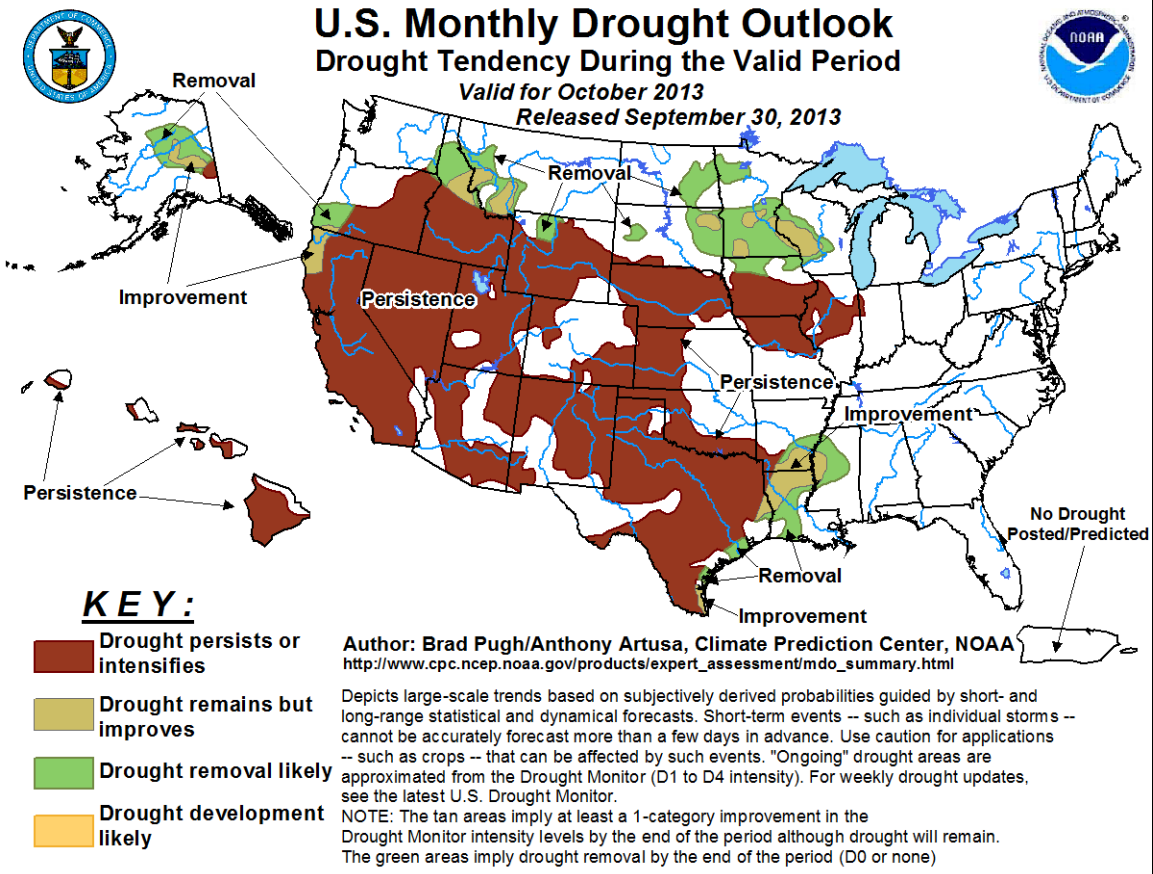
Questions and Comments

Thank you for your attention

Feel free to contact me anytime via e-mail if you have comments or questions.

Jon.Gottschalck@noaa.gov

Drought Outlooks

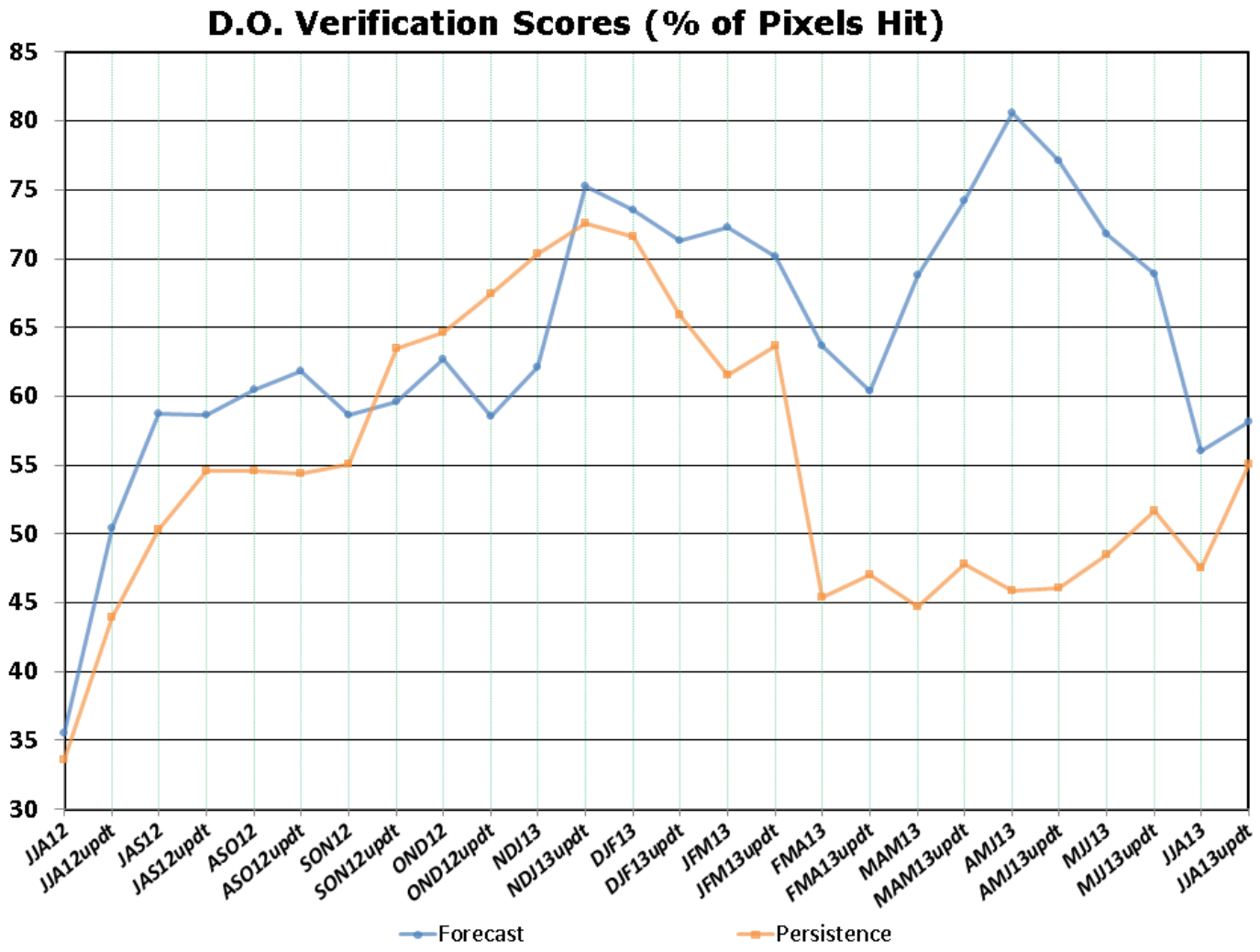


- Introduced monthly drought outlook in June 2013
- Changes in drought tendency categories this past year
- Range of timescales used:

--Short-, medium-, and extended-range model guidance and forecast tools
--CPC extended range, monthly and seasonal outlooks

- Impact of climatological wet and dry seasons also play a role

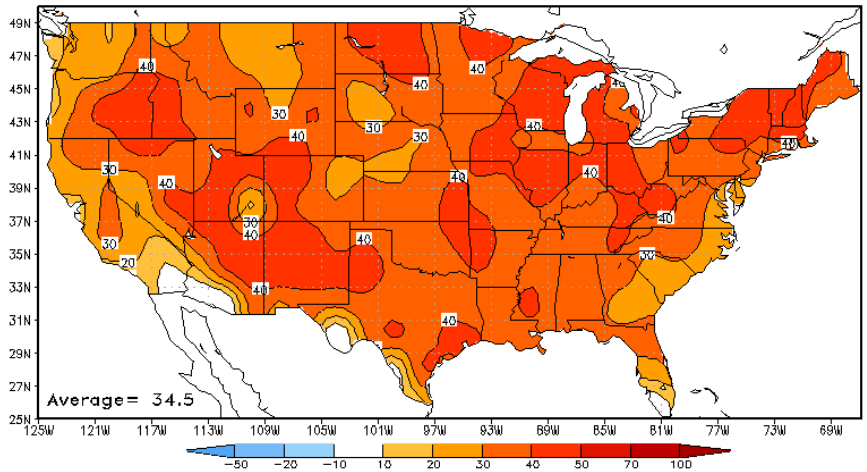
Drought Outlook Verification



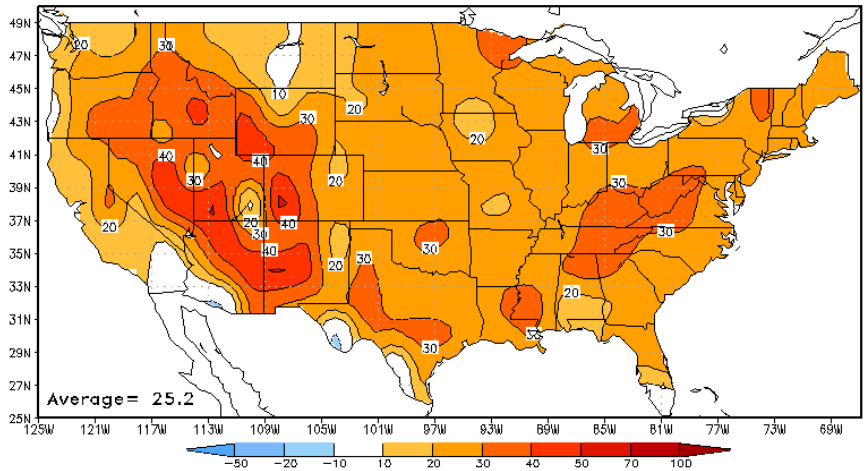
ERF Verification – Spatially

Temperature

6 to 10 Day Temperature Heidke Skill Score
365 Days of Manual Forecasts From 20121010 to 20131009

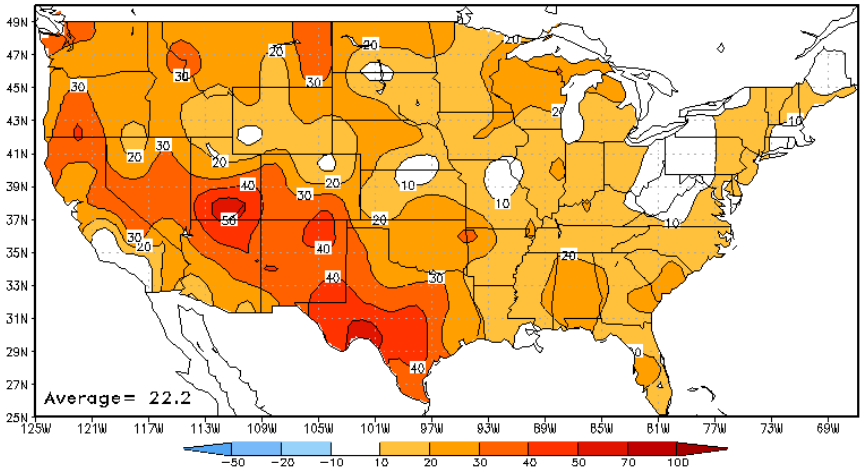


8 to 14 Day Temperature Heidke Skill Score
365 Days of Manual Forecasts From 20121009 to 20131008



Precipitation

6 to 10 Day Precipitation Heidke Skill Score
365 Days of Manual Forecasts From 20121010 to 20131009



8 to 14 Day Precipitation Heidke Skill Score
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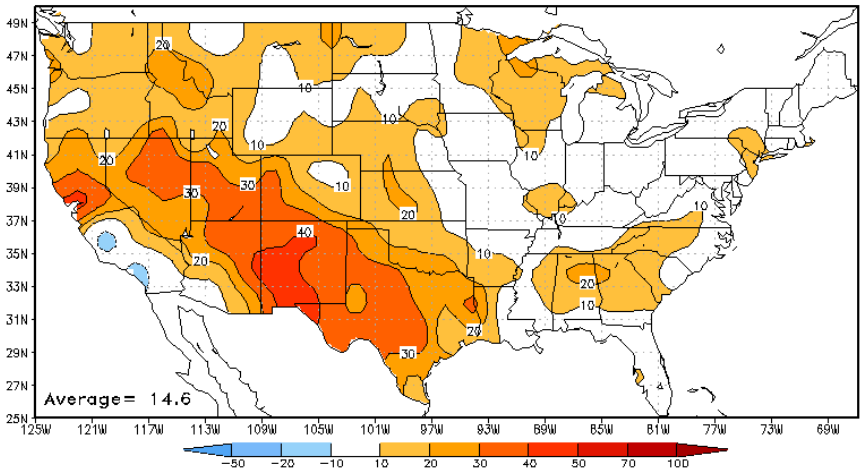
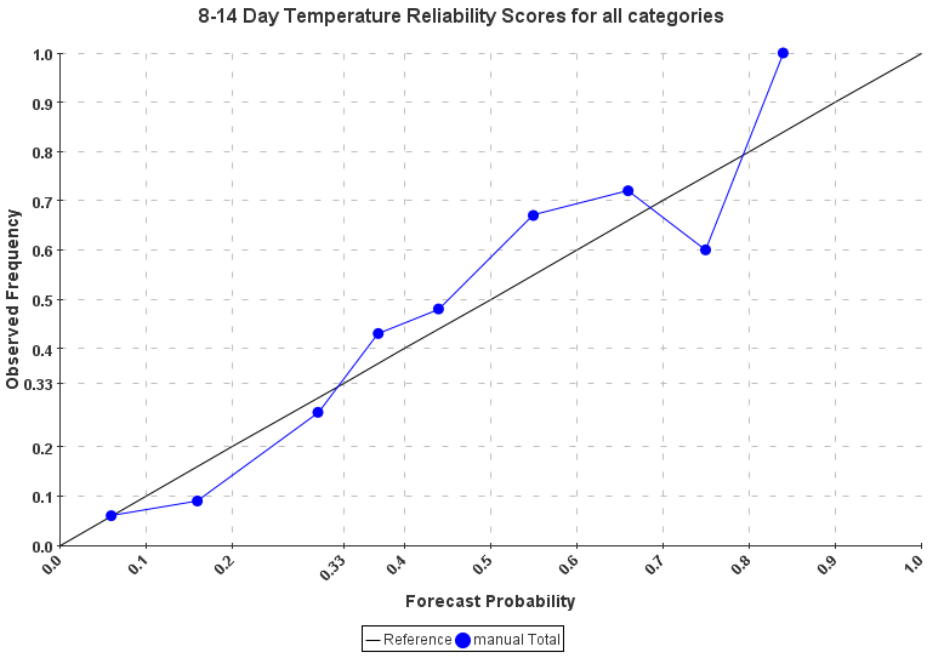
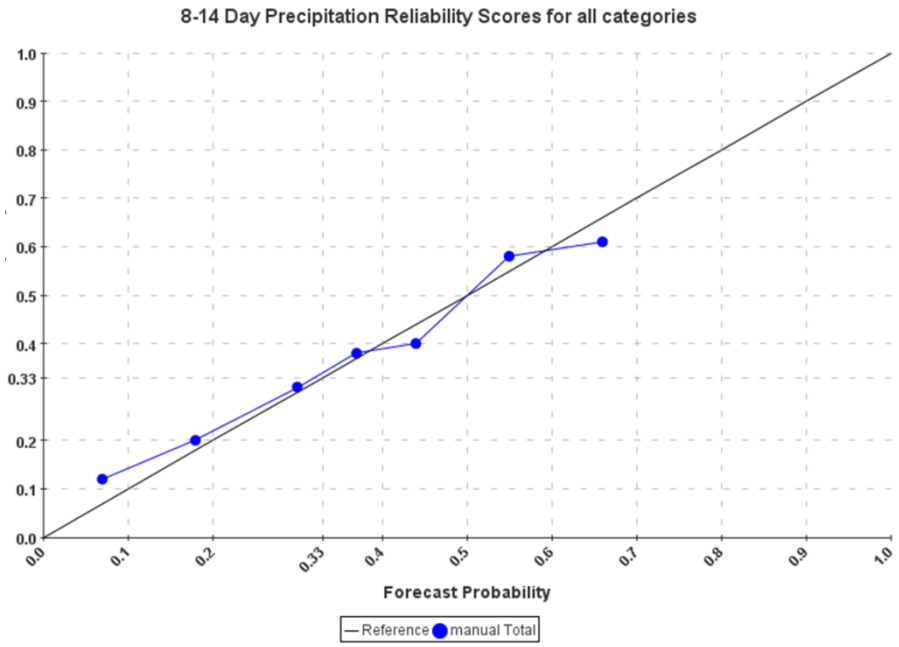
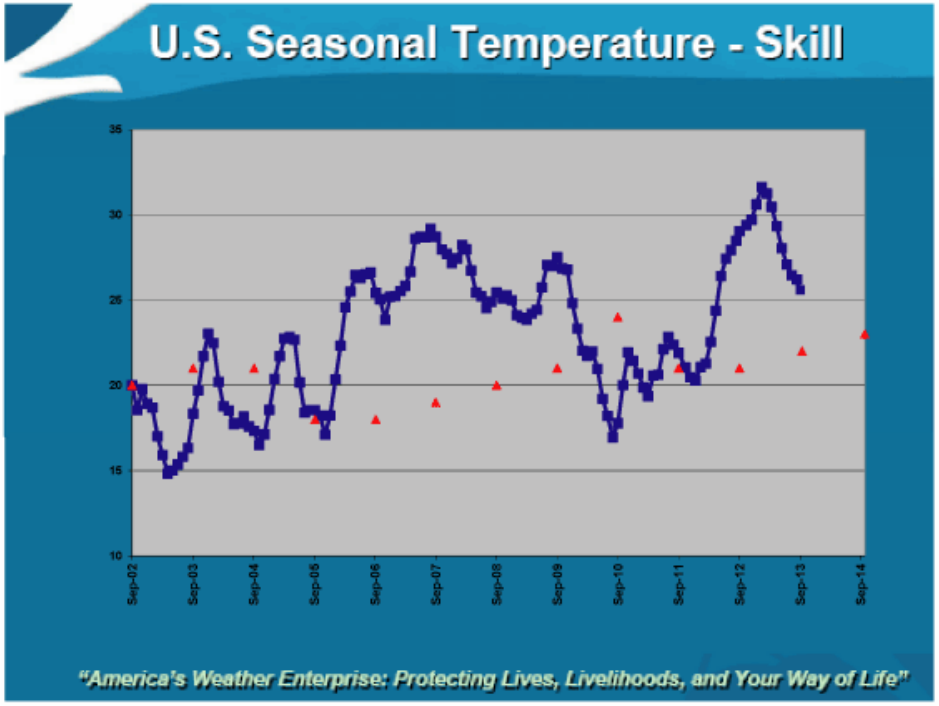


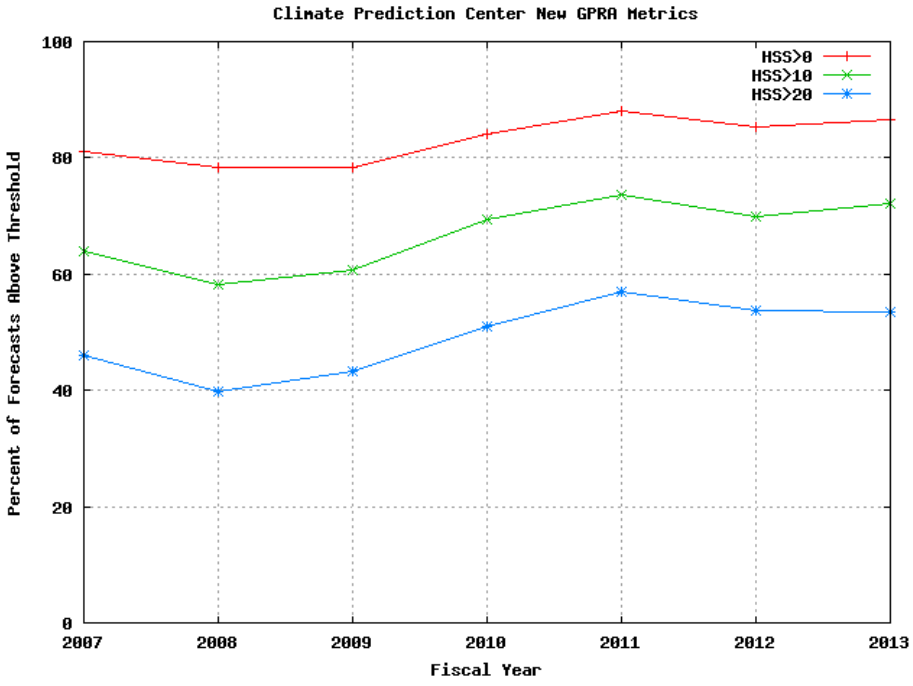
ERF Reliability





NWS HQ Metrics





48 month running mean of non-EC seasonal temperature HSS

Percent of "useful" forecasts (above a given HSS threshold) from ERF and LRF temperature and precipitation outlooks

Summary

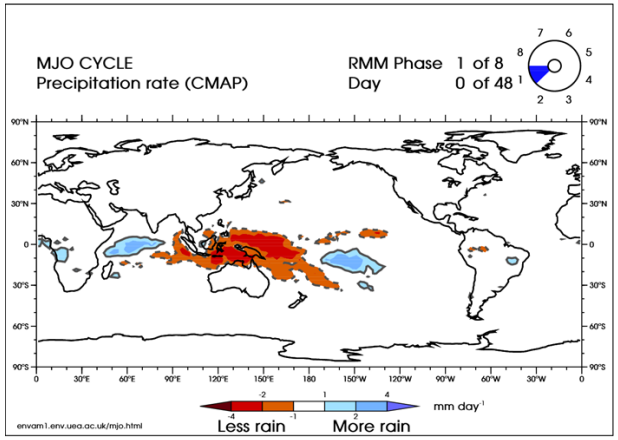
- CPC operational outlooks are wide ranging and span multiple time scales. Have varying launch schedules, forecast process and objectives.

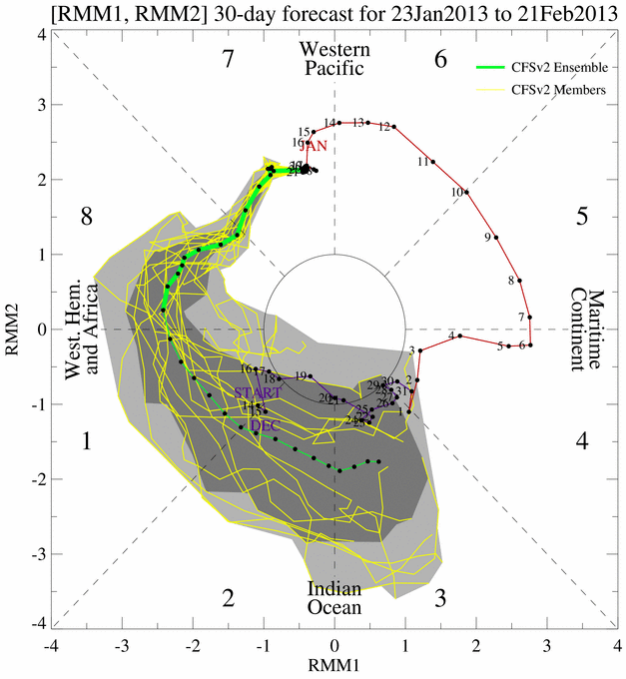
- CONUS ERF temperature scores were highest during Sep 2013 and lowest between Jun-Aug 2013. Precipitation forecasts were poor during Sep 2013. Skill was highest for the Southwest and Intermountain west.

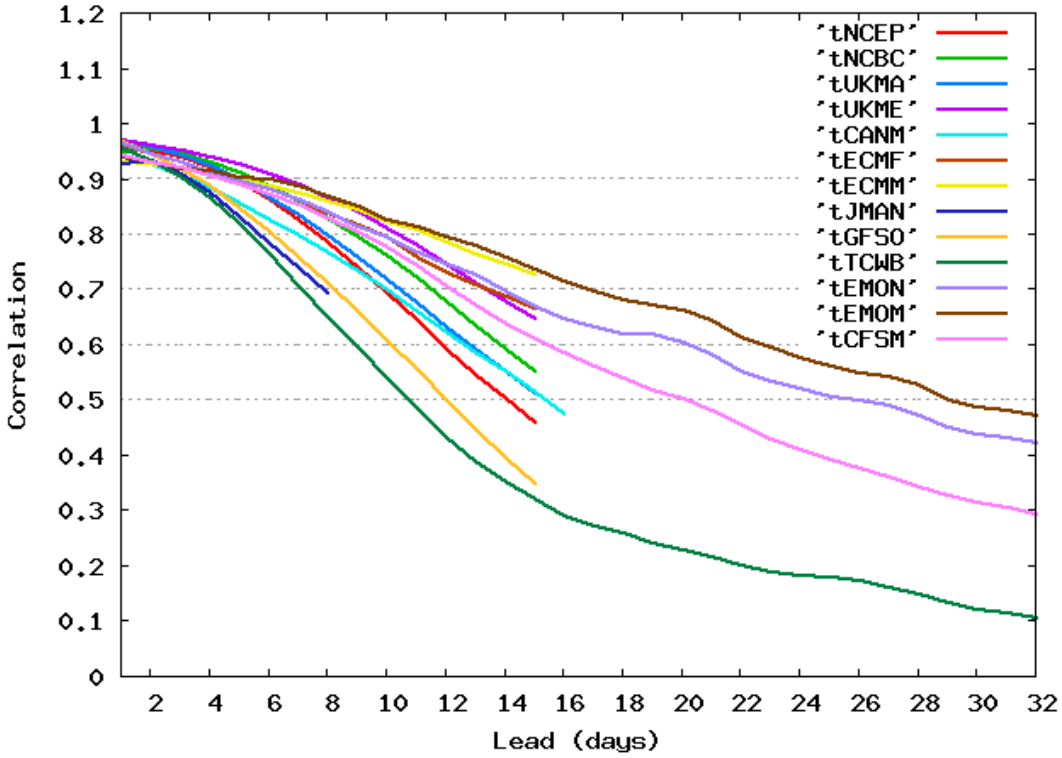
- Seasonal temperature outlooks were good for much of 2012 but were poor during the late winter and spring 2013. Precipitation scores were positive throughout most of the period, but poor during winter 2012-13.

- The greatest improvement over persistence in the seasonal drought outlooks occurred during the spring and summer months 2013.

MJO Index Verification







- Yellow Lines: 20 Individual Members, Green Line: Ensemble Mean
- RMM1 and RMM2 values for the most recent 40 days and forecasts for the next 30 days
- Light gray shading: 90% of forecasts, dark gray shading: 50% of forecasts

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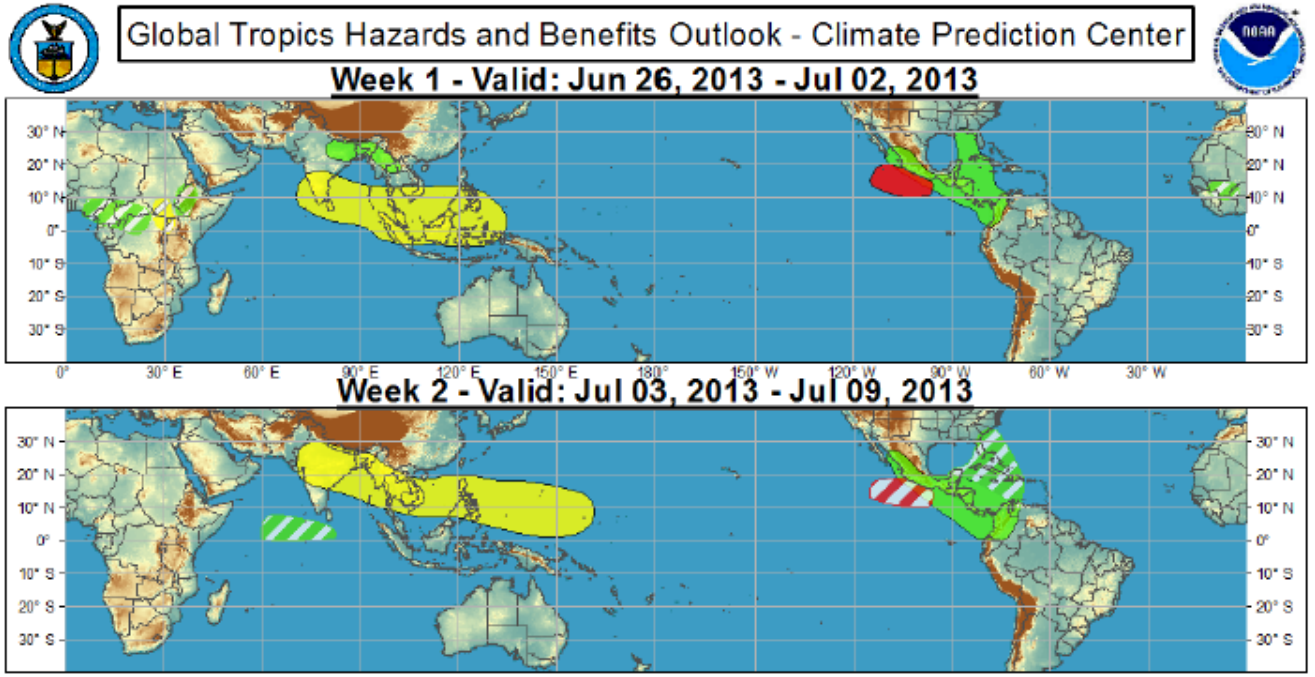
Global Tropics Hazards Outlook



Factors include ENSO, MJO, ER and Kelvin waves, statistical forecast tools (C-LIM, etc.), dynamical model output

Weekly coordination with SUNY, CICS, JTWC, NHC, NPS and NWS regions

GTH Outlook Verification